

Attorney docket 61450-012

Serial No. 09/389,841

Remarks

Claims 1-35, 54-55 and 58-61 are pending. The Examiner has rejected these claims under 35 U.S.C. 103(a) as being unpatentable over Sumi et al. (U.S. Patent 6,169,523) in view of Erhart et al. (Late-New Paper: Charge-Conservation Implementation in an Ultra Power AMLCD Column Drive Utilizing Pixel Inversion, in SID '97 Digest 1997, pp. 23-26). This rejection is traversed and reconsideration of the same is respectfully requested.

The invention is directed to a system and process that reduces the energy that is consumed by the charging and discharging of driver lines (e.g., column lines) in a display, such as an LCD display. After energy is delivered over the driving line to a pixel in the display, the pixel is electrically disconnected from the driving line and energy in the other capacitances associated with the driving line are recovered in an energy recovery system.

This inventive concept is expressed in the claims in various ways. Independent claims 1 and 13 refer to "delivering current through the line" and "recovering energy from the portion of the other capacitances without at the same time recovering energy stored in the first one of the capacitive elements" (e.g., pixel). Independent claim 25 recites that "the voltages on the capacitive elements (e.g., pixels) associated with the line not being materially changed during the [recovery] time period." Independent claim 54 recites "recovering energy stored in the other capacitances while maintaining the charge stored in the one of the plurality of pixels of a display." Independent claim 58 refers to "recovering energy from the other capacitances (e.g., other than from the capacitive element that was charged).

Neither Sumi et al. nor Erhart et al. disclose or suggest this concept, alone or in combination.

Sumi is directed to reducing the power dissipation in a shift register that is used in an LCD driver circuit. The shift register is repeatedly filled with the data to be displayed on successive lines of the display. Sumi et al. observe (column 1, lines 46-

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58) that the shift register dissipates a significant amount of electric power in normal operation due to its high switching activity. Sumi et al. introduce a way to disable the shift register when a still image is shown on the display. Since the data to be shown is already stored in the pixels of the display, there is no need to continually fill the shift register with the same data and write it to the display pixels. Instead, the data is read out from the pixels, in a manner similar to the read operation of a dynamic random-access memory; amplified to restore the original voltage level; and written back to the pixels.

Sumi et al. is therefore concerned about power dissipation in a display system. However, Sumi et al. seek to reduce the power dissipated in the shift register, while the subject invention seeks to reduce the dissipation associated with the charging and discharging of display lines. Indeed, Sumi et al. do not even appear to make any reference to recovering the energy associated with the parasitic capacitances of the drain lines of the display. In contrast, such a recovery is a principal focus of the subject invention.

To be sure, nowhere do Sumi et al. appear to teach or suggest electrically disconnecting a pixel element from a driving line while energy in capacitances associated with the driving line are recovered in an energy recovery system. Indeed, and as conceded by the Examiner, Sumi et al. do not ever appear to recover energy in capacitances associated with the driving line in an energy recovery system.

Erhart et al. do not make up for this deficiency. Erhart et al. are concerned about recovering energy that is stored in capacitance that is associated with the column lines. Unlike the subject invention, however, Erhart et al. do not appear to disconnect the pixel that the line has charged during the energy conservation process. To the contrary, the energy conservation step that Erhart et al. appear to follow occurs "as each row is selected." Col. 2, p. 24. As a result, energy appears to be added or drained from the pixels during the energy conservation process. This is fundamentally different from the system and process required by each of the subject patent claims.

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To be sure, nowhere does the Examiner specifically contend otherwise. The concept of leaving the charge on a pixel intact while energy on an associated driving line is being recovered is nowhere mentioned anywhere in the Office Action as a feature disclosed by any cited prior art reference. M.P.E.P. 2143 clearly prohibits the rejection of a patent claim where the references combined fail to teach or suggest all of the claim limitations.

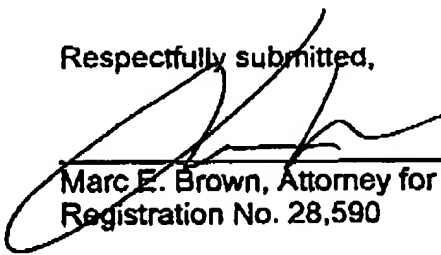
Conclusion

For the foregoing reasons, it is respectfully submitted that this case is now in condition for allowance and early notice of the same is earnestly requested.

The Commissioner is authorized to charge Deposit Account No. 501946 for payment of any additional fees required by this response or to credit any overpayment to the account; please reference attorney docket number 61450-012. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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